Update on
Global Cavity Database and
Yield Evaluation

ILC Cavity Database Group:

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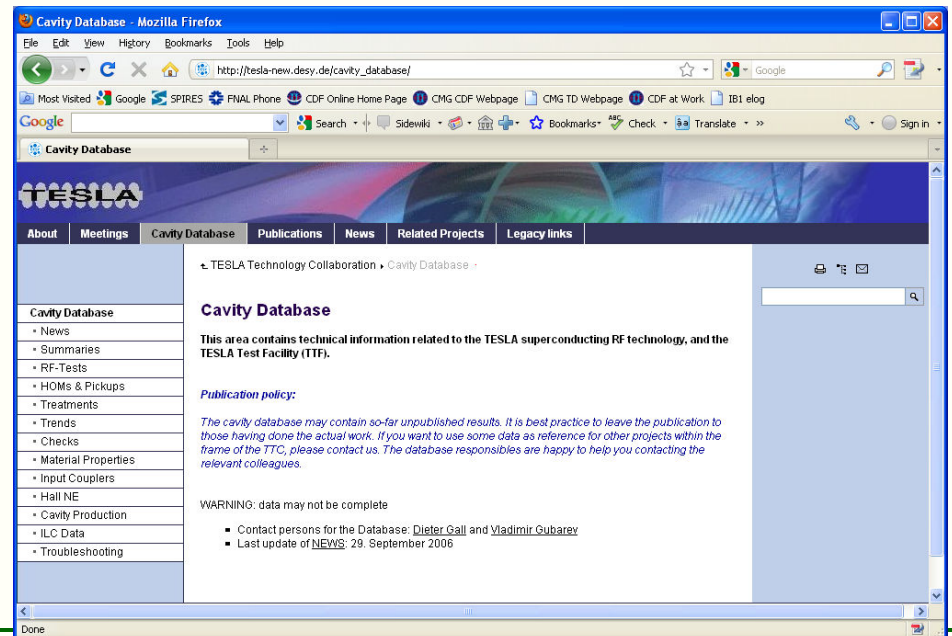
Global Cavity Database Motivation and Goals

- Common data sample, well defined data cuts
  - Everyone uses the same data to make plots – a common denominator in yield calculations
  - Data cuts can be easily specified, and anyone could reproduce your results
- Data entry rules for reliable and reproducible results
  - All RF tests from the last couple of years are included; may be flagged for exclusion
  - Uniform criteria for data entry: only allowed values for as many as possible items
  - Define everything which might vary or have underlying subtleties, e.g., "LABX#1" might be a final surface treatment referenced as a well-defined recipe anyone can look up
  - No private/sensitive vendor data
  - Anything referred to in a comment field must be for information only, and not data selection purposes
  - Minimize effort required for compliance
  - Provide regular updates at predetermined times

ILC Database tool now fully functional

- ILC Database tool was created by the DESY database group
  - DESY kindly agreed to provide limited support for inclusion of global data into their database
- All the participating labs have put their data into the ILC Database
- ILC Database is now fully functional
  - http://tesla-new.desy.de/cavity_database/

Click on "ILC Data"

Two choices: read-only (public) & edit (requires login)

ILC Database Screenshot

For those who have used the DESY database, this will look and feel very familiar

ILC Database: Selected Features (1)

Order and select cavities by features

Extract data in ASCII format and use your private spreadsheet

Make the standard first-pass yield plot defined by ILC DB group,

or make a plot using your own selection

ILC Database: Selected Features (2)

Click on an item to bring up a dialog box explaining definition

ILC Database Status/Plans

- All baseline requirements have been implemented by the DESY DB group

- A few fine-tuning items are still under discussion, to be implemented as time is available, e.g.,
    - How best to incorporate inevitable changes to the logic for standard plots
    - Implement more standard plots, etc.

- All cavity yield plots in the rest of this talk use data extracted from the ILC Database

LCWS2010 Cavity Yield Dataset

- ILC Database currently contains data from all three regions, from the last few years [92 cavities]

  - KEK [5 cavities]: [MHI005:MHI009]

  - JLab, Cornell, Fermilab [22 cavities]: [A5: A9], [TB9ACC010:TB9ACC017], [AES001:AES004], [TB9AES005:TB9AES010], JLAB-2

  - DESY [65 cavities]: [Z82:Z110], [AC112:AC129], [Z130:Z135,Z137:Z145], [AC147,AC149,AC150] (Production 4,5,6,7)

"Qualified-Vendor" Production Yield Plot (First Pass) - Definition

- **ILC Database 26.Mar.2010**

- **Cuts**
  - **Cavity from qualified vendor= ACCEL or ZANON or (AES SN>=5)**
  - **Fine-grain cavity**
  - **Use the first successful (= no system problem/limitation) test**
  - **Standard EP processing: no BCP, no experimental processes**
    - **Defined as JLab#1, DESY#2 (weld tank before test), DESY #4 (weld tank after test)**
    - **Ethanol rinse and 120C bake required for DESY cavities**
  - **(Ignore test limitation)**

- **Also known as "first-pass"**

- **Include binomial errors**

Electropolished 9-cell cavities

First-pass cavity yield at >25 MV/m is (66 +- 8) %
>35 MV/m is (28 +- 8) %

- **ILC Database 26.Mar.2010**

- **Cuts**
  - **Cavity from qualified vendor: ACCEL or ZANON or (AES SN>=5)**
  - **Fine-grain cavity**
  - **Use the first successful (= no system problem) test**
  - **Standard EP processing: no BCP, no experimental processes**
    - **Defined as JLab#1, DESY#2 (weld tank before test), DESY #4 (weld tank after test)**
  - **(Ignore test limitation)**
  - **Second pass**
    - **if (Eacc(1st successful test)<35 MV/m) then**
      - if (2nd successful test exists) then
        - » plot 2nd test gradient
      - else
        - » plot nothing [assume 2nd test didn't happen yet]
      - endif
    - **else**
      - plot 1st successful test gradient
    - **endif**

- **Include binomial errors**

"Qualified vendor" Up-to-Second Pass Yield

Electropolished 9-cell cavities
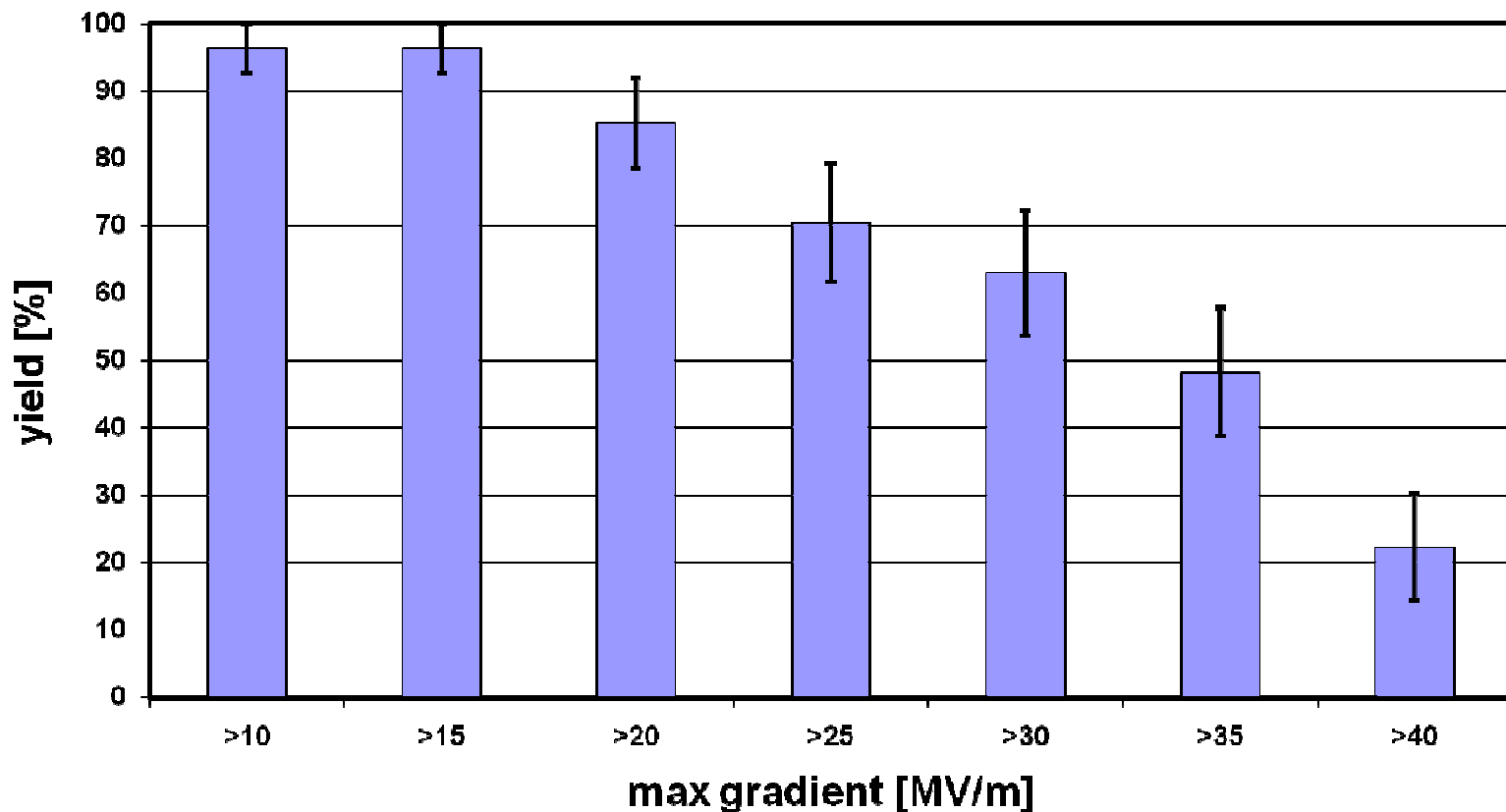
Up-to-second-pass cavity yield at >25 MV/m is (70 +- 9) %
>35 MV/m is (48 +- 10) %
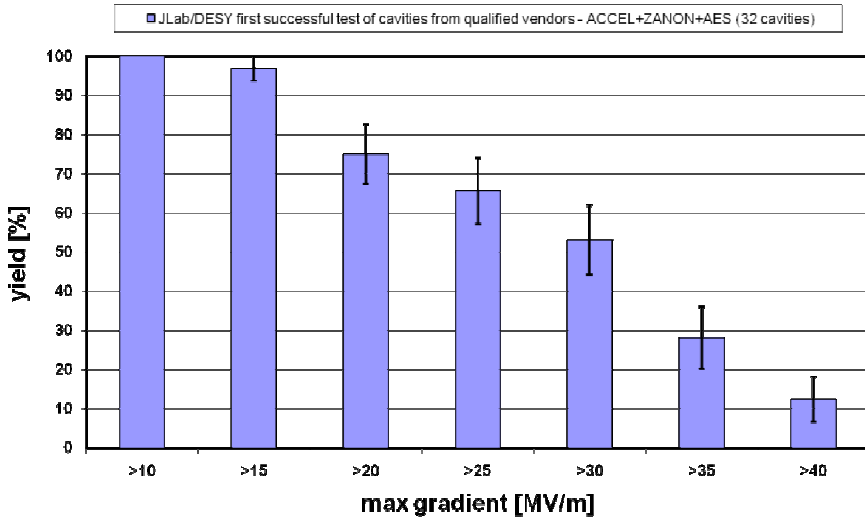
Compare 1st and 2nd pass yields
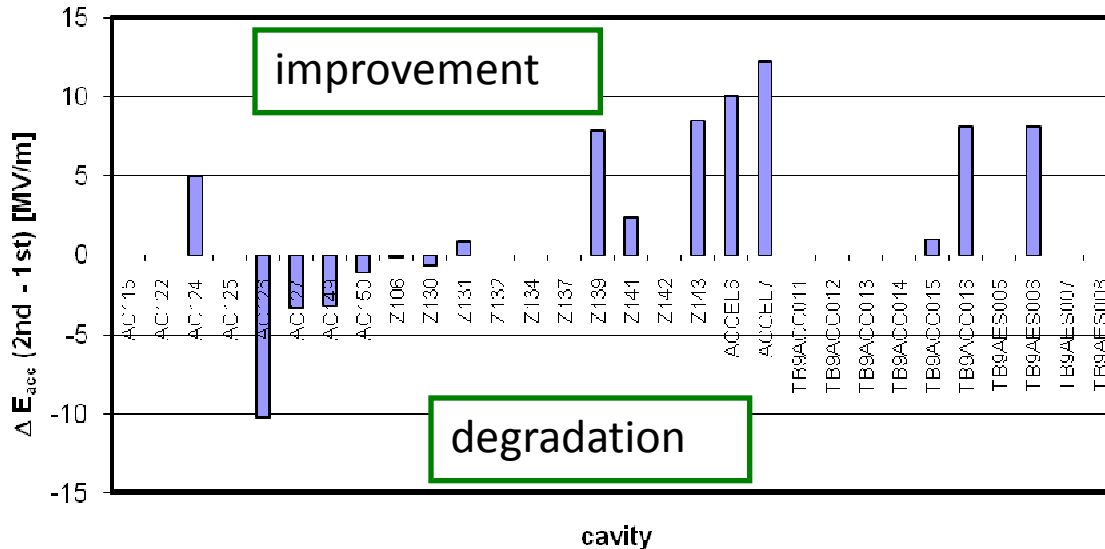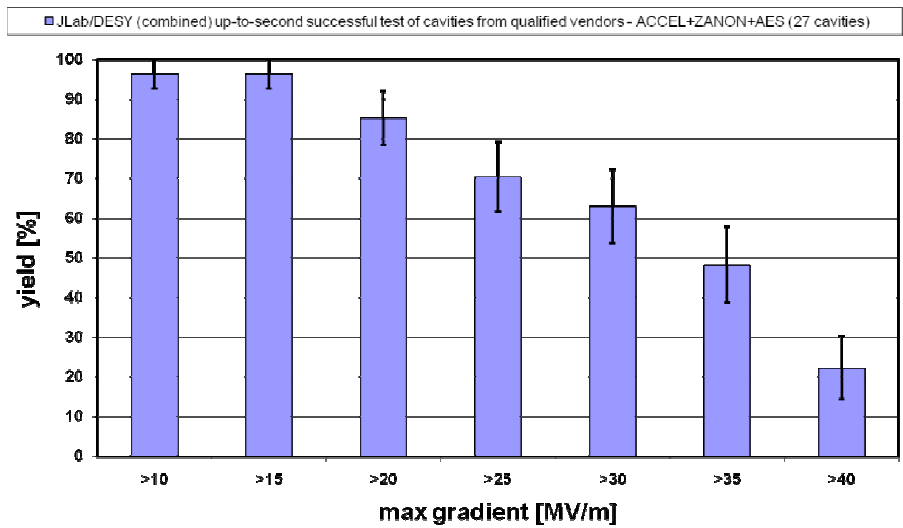
Compare 1st and 2nd pass yields (updated!)

1st pass

No.	Cavity	Test Date	Max. Eacc [MV/m]
1	TB9ACC013	01.Dec.08	41.80
2	TB9ACC014	09.Feb.09	41.50
3	TB9AES008	26.Aug.09	41.10
4	TB9AES007	16.Mar.10	41.00
5	AC122	26.Aug.08	38.88
6	AC115	11.Dec.07	38.60
7	TB9AES010	06.Nov.09	37.70
8	TB9ACC011	21.Aug.08	37.00
9	TB9ACC012	07.Jul.08	35.10
10	Z134	13.Nov.09	34.94
11	AC125	15.Jun.08	34.59
12	AC150	30.Jan.09	34.33
13	TB9AES009	18.Aug.09	33.40
14	Z143	09.Oct.08	32.57
15	Z106	21.Feb.07	31.70
16	AC127	13.Feb.09	31.25
17	TB9ACC016	14.Dec.09	31.20
18	ACCEL7	05.Sep.06	29.00
19	AC149	28.Jan.09	26.51
20	AC124	05.Feb.09	26.01
21	Z137	24.Feb.09	25.23
22	Z139	12.Sep.08	24.93
23	Z142	01.Jul.09	20.58
24	TB9AES005	27.Mar.09	20.50
25	ACCEL6	12.Dec.06	19.00
26	Z141	16.Apr.08	18.29
27	TB9ACC015	02.Jul.08	18.00
28	Z130	01.Sep.08	17.30
29	Z131	20.Aug.08	17.17
30	Z132	19.Aug.08	16.83
31	AC126	05.Sep.08	16.37
32	TB9AES006	09.Apr.09	14.10
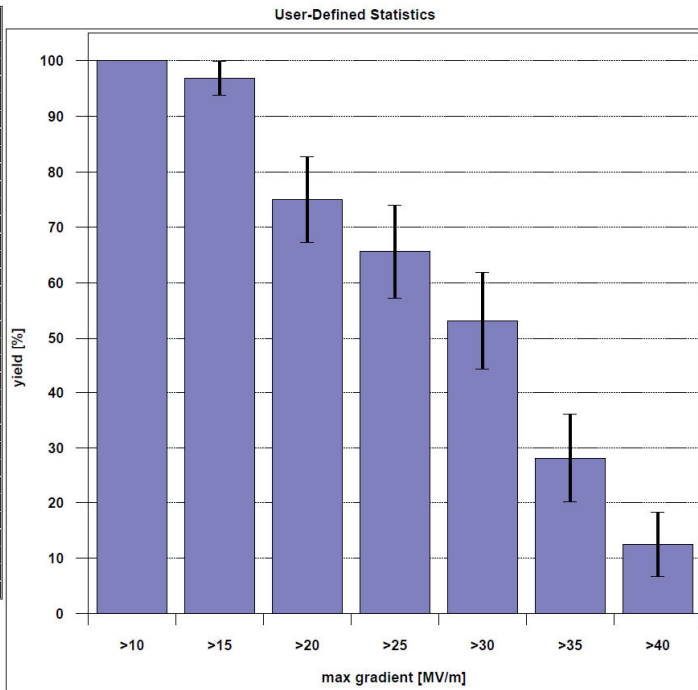
2nd pass

No.	Cavity	Test Date	Max. Eacc [MV/m]
1	TB9ACC013	01.Dec.08	41.80
2	TB9ACC014	09.Feb.09	41.50
3	ACCEL7	18.Jan.07	41.20
4	TB9AES008	26.Aug.09	41.10
5	Z143	12.Nov.08	41.00
6	TB9AES007	16.Mar.10	41.00
7	TB9ACC016	11.Feb.10	39.30
8	AC122	26.Aug.08	38.88
9	AC115	11.Dec.07	38.60
10	TB9AES010	06.Nov.09	37.70
11	TB9ACC011	21.Aug.08	37.00
12	TB9AES009	07.Oct.09	36.00
13	TB9ACC012	07.Jul.08	35.10
14	AC150	08.May.09	33.23
15	Z139	20.Oct.08	32.75
16	Z106	27.Feb.07	31.50
17	AC124	19.May.09	30.93
18	ACCEL6	23.Jan.07	29.00
19	AC127	11.Jun.09	27.85
20	AC149	05.May.09	23.27
21	TB9AES006	11.Sep.09	22.20
22	Z141	14.May.08	20.70
23	TB9AES005	09.Apr.09	20.50
24	TB9ACC015	14.Jul.08	19.00
25	Z131	25.Nov.08	17.96
26	Z130	15.Oct.08	16.60
27	AC126	21.Oct.08	6.14
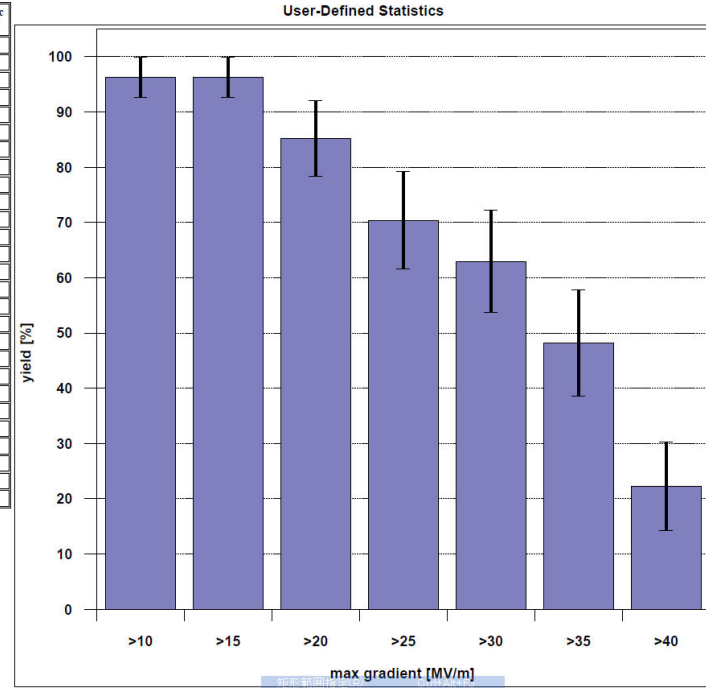
Yield as a Function of Time (one way of looking at it…)

	yield for [%]			
	>25 MV/m		>35 MV/m	
	1st pass	2nd pass	1st pass	2nd pass
ALCPG-Albuquerque 1.Oct.2009	63+-10	67+-10	23+-9	33+-10
AAP-Oxford 6.Jan.2010	63+-9	64+-10	27+-8	44+-10
LCWS-Beijing 28.Mar.2010	66+-8	70+-9	28+-8	48+-10

NB: errors are very strongly correlated

Within the very limited additional statistics accumulated over the last six months there appears to be improvement in the yield

Summary

- ILC Database now fully functional and available for use

- Updated yield plots were shown
    - First-pass cavity yield at >25 MV/m is (66 +- 8) %
    - >35 MV/m is (28 +- 8) %
    - Up-to-second-pass cavity yield at >25 MV/m is (70 +- 9) %
    - >35 MV/m is (48 +- 10) %

- We will continue to update the ILC database as we have more cavity tests, and systematically update the cavity yield data